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Volume I Executive Summary Addendum to 2011 Report

June 2013

Counterproliferation Program Review Committee

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INTRODUCTION

This *Report on Activities and Programs for Countering Proliferation and Nuclear, Biological, and Chemical (NBC) Terrorism* provides the latest findings of the inter-agency Counterproliferation Program Review Committee (CPRC). This report is an update to the 2011 CPRC Report.

NATIONAL STRATEGIES AND COMBATING WEAPONS OF MASS DESTRUCTION (WMD)

National strategy forms the context to develop implementing guidance and policies, as well as doctrine, organization, training, materiel, leadership and education, personnel, and facilities (DOTMLPF) (see Figure 1). The following national-level documents provide strategic guidance for U.S. Government (USG) departments and agencies to develop goals and objectives, identify capability requirements, and ultimately provide the material and nonmaterial solutions for combating weapons of mass destruction (CWMD):

- 2012 *Sustaining U.S. Global leadership: Priorities for 21st Century Defense*
- 2012 *National Strategy for Biosurveillance*
- 2011 *National Strategy for Counterterrorism*
- 2010 *Nuclear Posture Review Report*
- 2009 *National Strategy for Countering Biological Threats*
- 2006 *National Strategy for Strategic Interdiction*
- 2002 *National Strategy to Combat Weapons of Mass Destruction*

High-level goals and objectives for the CPRC member organizations are published in strategic-guidance documents tailored to the needs of their own internal communities:

- Department of Defense (DoD): The Chairman of the Joint Chiefs of Staff's 2006 *National Military Strategy to Combat Weapons of Mass Destruction* defines eight broad CWMD mission areas for the Military Departments and other DoD organizations. The Assistant Secretary of Defense for Nuclear, Chemical and Biological Defense Programs' (ASD (NCB)), 2012 *Chemical and Biological Defense Program (CBDP) Strategic Plan*, provides guidance for determining how evolving threats and the fiscal environment are strategically incorporated among DoD, interagency, international, and non-governmental partners, in order to meet Warfighter requirements. The 2012 *DoD Combating WMD Global Campaign Plan* provides a strategic guidance and an operational construct for CWMD. The



Figure 1. Strategic Guidance Framework

Assistant Secretary of Defense for Global Strategic Affairs' (ASD (GSA)) 2013 *DoD Cooperative Threat Reduction (CTR) Strategic Guidance* informs decision-making, assists in scoping *CTR Program* country and regional engagements, and establishes priorities for reducing the threat to the U.S. and its allies from WMD and related materials, technologies, and expertise, including associated delivery systems and infrastructure.

- Department of Energy (DOE): The 2011 *DOE National Nuclear Security Administration Strategic Plan* sets the goal of enhancing nuclear security through defense, nonproliferation, and environmental efforts. DOE provides the scientific and technical knowledge to enable national security agencies to understand and counter dangers arising from foreign nuclear weapons programs, the spread of nuclear capabilities and expertise to additional countries, and the potential exploitation of nuclear and radiological materials, technology, and expertise by terrorists.
- Office of the Director of National Intelligence (ODNI): *The National Intelligence Strategy (NIS) for 2009* presents the way ahead for the Intelligence Community (IC) to operate as a fully integrated and agile enterprise. It describes mission objectives for the IC including objectives to: "Combat Violent Extremism" and "Counter WMD Proliferation." The NIS sets the IC's strategic priorities and guides current and future decisions on budgets, acquisitions, and operations for these and other missions.
- Department of Homeland Security (DHS): The 2010 *Quadrennial Homeland Security Review Report* focuses on ensuring the homeland is safe, secure, and resili-ent against terrorism and CWMD hazards.
- Department of State (DOS): The first *Quadrennial Diplomacy and Development Review: Leading Through Civilian Power (2010)* provides a blue print for building a civilian conflict and crisis prevention and response capability at the State Department in coordination with other agencies and international partners.

AREAS FOR CAPABILITY ENHANCEMENT

To organize efforts effectively, the CPRC established Areas for Capability Enhancement (ACE) categories. ACEs are broad and comprehensive areas for CWMD. They reflect the *National Military Strategy To Combat Weapons of Mass Destruction*'s eight mission areas and one strategic enabler (Intelligence), address DoD, DOE, DOS, IC, and DHS's strategic goals and objectives, and include capability needs developed by the IC and other Federal departments and agencies. They additionally address the three pillars of the *National Strategy To Combat Weapons of Mass Destruction*. The ACEs provide a framework for reviewing progress, assessing CWMD requirements, and measuring investment in technologies and capabilities for CWMD. It is important to maintain capabilities in all ACE areas in order to meet the USG's CWMD objectives more effectively. The ACEs are presented in Table 1.

Table 1. Areas for Capability Enhancement*

Interdiction. Operations designed to stop the transit of WMD, delivery systems, associated and dual-use technologies, materials, and expertise between states of concern and non-state actors, whether undertaken by the Armed Forces or by other agencies of government.
Elimination. Operations to systematically locate, characterize, secure, disable, and/or destroy a state or non-state actor's WMD programs and related capabilities in hostile or uncertain environments.
Threat Reduction Cooperation. Activities undertaken with the consent and cooperation of host nation authorities to enhance physical security, emplace detection equipment, and to reduce, dismantle, redirect, or improve protection of a state's existing WMD program, stockpiles, and capabilities.
Passive Defense. Measures to minimize or negate the vulnerability and effects of WMD employed against U.S. and partner/allied armed forces, as well as U.S. military interests, installations, and critical infrastructure.
Security Cooperation and Partner Activities. Activities to improve partner and allied capacity to combat WMD across the eight mission areas through military-to-military contact, burden-sharing agreements, combined military activities, and support to international activities.
Offensive Operations. Kinetic (both conventional and nuclear) and/or non-kinetic options to deter, neutralize, or defeat a WMD threat or subsequent use of WMD.
Active Defense. Measures, to include but not limited to, missile defense (ballistic and cruise), special operations, and security operations to defend against conventionally and unconventionally delivered WMD.
WMD Consequence Management. Actions taken to reduce the effects of a WMD attack or event, including toxic industrial materials (TIM), and assist in the restoration of essential operations and services at home and abroad.
Intelligence. Timely collection, analysis, and dissemination of actionable intelligence to combat the development and spread of weapons of mass destruction and detect, identify, and characterize the location, nature, and ownership of WMD. This includes collection and analysis of intentions, motivations, and disincentives policymakers can use to dissuade, deter, and otherwise counter WMD.

*The CPRC ACEs are based on the descriptions of CWMD military mission areas found in the 2006 *National Military Strategy To Combat Weapons of Mass Destruction*.

ASSESSMENT OF PROGRESS IN MEETING COMBATING WMD GOALS

The assessment of progress of CWMD capabilities accounts for the broad range of activities reported by the CPRC member organizations and includes the unique perspectives of a widening community-of-interest for CWMD. Each of the member organizations reviewed and updated its prioritized shortfalls, current and projected capabilities, and programmatic details of more than 200 CWMD programs and projects. Table 2 presents a summary assessment of goals, ongoing efforts to include recent accomplishments, and recommendations to address the shortfalls identified by each organization.

Table 2. ACE Assessment Summary

Interdiction
Goals
<ul style="list-style-type: none">• Develop plans, policy, and doctrine for interdiction.• Enhance joint command and control (C2), communications systems, intelligence, surveillance, and reconnaissance (ISR), and capabilities to locate, tag, and track WMD and related materials and components and to link information on trade or transfer of WMD.• Provide operational constructs, force structure, CWMD expertise, and interdiction capabilities, including non-lethal means, and special operations forces (SOF) capabilities.• Improve logistics to support interdiction.• Build and implement a <i>Global Nuclear Detection Architecture (GNDA)</i>.• Build allied and partner military capabilities to conduct WMD interdiction in support of their own national authorities and international laws. (Proliferation Security Initiative (PSI)).• Focus intelligence collection on possible transfer methods and activities to identify and track the potential transfer of WMD-related material, technology, or expertise.• Surveil and intercept the transit of suspected WMD materials and components by land, sea, or in the air.• Identify and characterize the suspected WMD materials or components.• Prevent the unauthorized acquisition or use of chemical, biological, radiological, and nuclear (CBRN) materials and capabilities, specifically anticipate emerging threats, control access to and movement of CBRN materials, and protect against hostile use of CBRN materials.
Ongoing Efforts
<ul style="list-style-type: none">• The DHS/Domestic Nuclear Detection Office (DNDO) supported DHS/Customs and Border Protection (CBP) in completing congressionally-mandated covert testing at the top 22 seaports. DHS/DNDO is evaluating options to address scanning efficiency via the <i>Radiation Portal Monitor (RPM) Improvement Project</i>, in cooperation with DHS/CBP, to determine whether the adjusted threshold settings could be used in the port where the evaluation is being conducted, serve as a baseline for future studies to refine those settings, and evaluate their potential at other ports. DNDO is also conducting studies exploring RPM service life extension options and for FY 2014 has plans to complete an Analysis of Alternatives for RPM replacement options..• The Joint Program Executive Office for Chemical and Biological Defense (JPEO-CBD) has procured, installed, and fielded 11 fixed site tunnel detection kits (with 3 spare kits) and 5 mobile/mapping tunnel kits (with 1 spare) under Joint Urgent Operational Needs Statement (JUONS) CC-0466 to support U.S. Central Command (USCENTCOM). This technology detects tunnel-related activities (and threats), tunnel infrastructure or voids resulting in a determination of tunnel location, and direction for mapping, exploitation, and closure at critical outside-the-continent United States (OCONUS) infrastructures.• The JPEO-CBD continues to field urgent force protection equipment to the Warfighter. Recently Joint Program Manager (JPM) Guardian completed the delivery of the last 14 personnel scanners to Operation Enduring Freedom (OEF) for use at entry control points (ECPs). This completes the delivery under JUONS CC-0315 of 250 total units, as required by the Combatant Command (i.e., 51 high energy vehicle/cargo scanners, 31 low energy vehicle/cargo scanners and 168 personnel scanners). Additionally, under JUONS CC-0315, JPM Guardian is currently installing an ECP Control Station to monitor and control access barriers and sensor systems at ECPs at prioritized locations in the OEF theater.

Table 2. ACE Assessment Summary (continued)

Interdiction (continued)	
Ongoing Efforts (continued)	
<ul style="list-style-type: none"> JPEO-CBD has continued installation of <i>Integration Commercial Intrusion Detection System (ICIDS)</i> at numerous continental United States (CONUS) locations. U.S. Pacific Command (USPACOM) will host the first exercise in the Pacific Exercise Rotation at Pearl Harbor, Hawaii between June and August 2014. USPACOM will hold the exercise either before or after a major multi-national Pacific Fleet-led maritime exercise in order to take advantage of the visiting national forces. The initial concept for the exercise will include an at-sea maritime interdiction scenario and an in-port tabletop exercise. The Defense Threat Reduction Agency & U.S. Strategic Command Center for CWMD's (DTRA/SCC-WMD) Counter WMD Technologies Department, J9-CX, and U.S. Army Program Manager for Unmanned Aircraft Systems (PM UAS) signed a Technology Transition Agreement (TTA) to transition DTRA/SCC-WMD-developed UAS CBRN assessment <i>WMD Aerial Collection System (WACS)</i> payloads in FY 2014. The <i>Proliferation Security Initiative (PSI)</i>, supported by DoD, DOS, and other interagency partners, helps build global WMD interdiction capabilities. <i>PSI</i> exercises include PANAMAX (U.S. Southern Command) and LEADING EDGE (USCENTCOM). The <i>PSI</i> is a global effort that aims to stop trafficking of WMD, their delivery systems, and related materials to and from States and non-State actors of proliferation concern. Participating countries agree to establish a more coordinated and effective basis through which to impede and stop WMD, their delivery systems, and related items. The countries commit to: (1) interdict transfers to and from States and non-State actors of proliferation concern to the extent of their capabilities and legal authorities; (2) develop procedures to facilitate exchange of information with other countries; (3) strengthen national legal authorities to facilitate interdiction; and (4) take specific actions to support interdiction efforts. 	
Recommendations	
<ul style="list-style-type: none"> DHS and DoD, using the appropriate requirements process, develop solutions for WMD interdiction gaps/shortfalls. Improve intelligence gathering, analysis, and fusion (e.g., information management systems, decision support systems, sensor development, intelligence analysis capacity, and technical expertise) regarding State and non-State WMD proliferation and development activities. Pursue real-time detection and identification of biological and chemical threat agents, enabling timely and focused response. Apply socio-behavioral models and assessments of adversaries to develop indicators of an individual or group's interest, motivation, and intent to develop, acquire, and use WMD. Provide threat-based warnings to border and immigration officials in the United States and abroad to enhance screening of known or suspected WMD-related persons. Improve maritime interdiction capabilities to prevent illicit chemical, biological, radiological, nuclear, and high- yield explosives (CBRNE) material from entering U.S. ports and harbors. Develop or adapt, and operationally prove capabilities for in-transit detection of nuclear/radiological materials aboard ships and aircraft. Improve connectivity for operational elements in order to enable remote access to subject matter expertise. Provide threat-based technical assessments and reachback assistance to border officials to enhance screening operations of weapons-useable materials, components, devices, and other materials of concern. Improve efficiency of nuclear forensics material characterization operations from collections to evaluations in support of WMD-related collection activities. Support continued progress on the R&D priorities as stated in the <i>National Technical Nuclear Forensics (NTNF) Capability</i>-led Office of Science and Technology Policy Nuclear Defense R&D Roadmap Nuclear Forensics Working Group Chapter. Conduct more robust and expansive <i>NTNF</i> exercises. 	
Elimination	
Goals	
<ul style="list-style-type: none"> Develop plans, policy, and doctrine for elimination. Enhance joint C2, communications systems, ISR, and capabilities to locate, detect, identify, characterize, tag, and track WMD production and storage. Provide operational constructs, force structure, and WMD render-safe skills and capabilities, including reachback. Improve logistics to support elimination. Secure suspected WMD sites, material, equipment, and personnel. Destroy, dismantle, remove, transfer, or dispose of an adversary's WMD material, weapons equipment, and infrastructure. Conduct intelligence exploitation of program experts, documents, and other media as well as secure weapons, material, agents, delivery means, and related processes and facilities. Monitor, redirect and convert elements of an adversary's WMD program to ensure that eliminated programs are not reconstituted. 	

Table 2. ACE Assessment Summary (continued)

Elimination (continued)
<p style="background-color: #ffffcc;">Ongoing Efforts</p> <ul style="list-style-type: none"> • The Standing Joint Force Headquarters for Elimination (SJFHQ-E) reached Initial Operating Capability on September 17, 2012. Since the stand-up of SJFHQ-E on February 4, 2012, the SJFHQ-E staff has been actively involved in both real world and exercise/simulated operations involving WMD elimination and the broader CWMD pillar of counterproliferation in multiple theaters including both USPACCOM and USCENTCOM. The SJFHQ-E will reach Full Operational Capability in October 2013. • Completed the Elimination Initial Capabilities Document (ICD) in November 2012. • The Joint Science and Technology Office, DTRA/SCC-WMD J9-CB, is sponsoring a Limited Objective Experiment for Elimination, in partnership with the Joint Staff's Joint Requirements Office (JRO), in order to: develop a <i>Science and Technology (S&T) Roadmap for Elimination</i>; assist in developing the Concept of Elimination Operations; standardize the lexicon for elimination operations. • The DTRA/SCC-WMD Counter WMD Technologies Department, J9-CX, is sponsoring a WMD ISR effort to develop, mature, and integrate technologies to improve capabilities to search for, detect and identify CBRN threats before their release. • In April 2013, U.S. Strategic Command (USSTRATCOM) completed the Joint Emergent Operational Need to Eliminate Bulk Chemical Warfare Materials. • In February 2013, the DoD began efforts to develop capabilities to eliminate worldwide chemical stockpiles.
<p style="background-color: #cccccc;">Recommendations</p> <ul style="list-style-type: none"> • Using the appropriate requirements process, develop solutions for WMD elimination gaps/shortfalls. • Improve intelligence gathering, analysis, and fusion (e.g., information management systems, decision support systems, sensor development, intelligence analysis capacity, and technical expertise) regarding State and non-State WMD proliferation and development activities • Encourage and fund research in agent-environment interaction and novel high-energy material science. • Explore applicability of commercial technologies for CBRNE remediation for possible use in elimination missions. • Improve capability to conduct exploitation of WMD sites, including characterization of local WMD, onsite analysis, and data exfiltration. • Provide reliable and secure transportation and storage for further disposition of WMD-related materials. • Develop destruction capabilities for rapid deployment to eliminate chemical and biological weapons stockpiles to include agents and precursors.
Threat Reduction Cooperation
<p style="background-color: #ffffcc;">Goals</p> <ul style="list-style-type: none"> • Enhance capabilities to improve safeguards, physical security, and materials protection, control, and accounting of CBRN stockpiles. • Enhance capabilities to consolidate, reduce, or dismantle CBRN stockpiles and capabilities. • Expand threat reduction activities outside the former Soviet Union by adapting existing or developing new cooperative frameworks and diplomatic initiatives. • Increase transparency through confidence-building arrangements and encourage higher standards of conduct in controlling CBRN materials. • In coordination with all relevant federal agencies, enable international partners to detect and capture WMD crossing their borders. • Develop plans, policy, and doctrine for expanded Threat Reduction Cooperation roles.
<p style="background-color: #ffffcc;">Ongoing Efforts</p> <ul style="list-style-type: none"> • The National Nuclear Security Administration, through its Office of Defense Nuclear Nonproliferation, works closely with a wide range of international partners, key U.S. federal agencies, the U.S. national laboratories, and the private sector to detect, secure, and dispose of dangerous nuclear and radiological material, and related WMD technology and expertise. • Provide technical support for Russian destruction of chemical weapons at the <i>Shchuch'ye Chemical Weapons Destruction Facility (CWDF)</i>. • Provide security and safety improvements to the <i>Libyan Chemical Weapons Storage Facility (CWSF)</i> at Waddan. • Provide technical advice and assistance support for chemical weapons destruction planning at the <i>Waddan CWSF</i>.

Table 2. ACE Assessment Summary (continued)

Threat Reduction Cooperation (continued)	
Recommendations	
<ul style="list-style-type: none">• DHS, DOE, and DoD develop solutions for WMD Threat Reduction Cooperation gaps/shortfalls.• Improve detection of nuclear materials.• Improve development of more discriminating and sensitive sensors to monitor strategic transportation nodes.• Increase biological threat reduction activities to consolidate and secure pathogens and build detection and response systems to provide early warning of a disease outbreak or biological attack.• Improve intelligence gathering, analysis, and fusion (e.g., information management systems, decision support systems, sensor development, intelligence analysis capacity, technical expertise) regarding State and non-State WMD proliferation and development activities• Coordinate U.S. threat reduction cooperation efforts through a coordinating committee or group.• Develop an OCONUS Nuclear Forensics Response Playbook to include cooperation and policy coordination with the international community.• Develop bulk chemical weapons agent destruction technologies that are transportable and/or modular to increase readiness to respond to contingency scenarios.	
Passive Defense	
Goals	
<ul style="list-style-type: none">• Sense. Provide real-time and continuous capability to detect, identify, and quantify all potential or validated CBRN threats in all operational environments and on personnel, equipment, or facilities.• Shape. Characterize CBRN hazards throughout the operational environment through the collection and fusion of information from all CBRN defense assets and integration of that data with other relevant information and C2, communications, and ISR systems• Shield. Protect personnel and equipment from degradation caused by CBRN hazards by preventing or reducing exposures, mitigating negative physiological effects, and protecting critical equipment.• Sustain. Enable the quick restoration, recovery, and maintenance of combat power or essential functions that are free from the effects of CBRN hazards and return to pre-incident operational capability as soon as possible.• Deter. Provide significant CBRN defensive capabilities to deny potential adversaries from achieving their desired effects of creating a catastrophic event with WMD.	
Ongoing Efforts	
<ul style="list-style-type: none">• DoD/DTRA memorandum of agreement (MOA) with DHS/DNDO to provide rigorous, repeatable test and evaluation support for nuclear, radiological, and fissile material detection, standoff detection technologies, and prototype systems.• Building space-based sensors and providing ground-based models to operational programs for the global monitoring of nuclear detonations through DOE and DoD research and development efforts.• The Office of the Assistant Secretary of Defense for Health Affairs (OASD(HA)) is updating Department of Defense Directive (DoDD) 6205.02E "<i>DoD Immunization Program</i>" to establish a single DoD <i>Immunization Program</i> to protect Service members and eligible DoD beneficiaries against endemic and emerging diseases as well as deliberately released biological warfare agents.• OASD(HA) and OASD(NCB) developed and signed an MOU to enhance collaboration within DoD to create synergistic biosurveillance strategies and coordinate assets globally to detect and characterize military-relevant biological and emerging and re-emerging infectious disease threats more effectively.• OASD(HA) updated DoDD 6490.02E "<i>Comprehensive Health Surveillance</i>", establishing a force health protection policy that requests comprehensive, continuous, and consistent health surveillance of all DoD personnel throughout their military service and employment both in garrison and during deployment against disease, injury, and terrorist attack.• DoDI 6440.03, "<i>DoD Laboratory Network</i>", was issued in June 2011. This instruction establishes policy, provides instructions, and introduces a forum which allows DoD laboratories, programs, and activities with analytic and/or related response capabilities to coordinate execution, develop consensus, and make recommendations governing the detection, identification/characterization/diagnosis, and reporting of CBRN agents, infectious diseases, and other all-hazards agents of military and/or national significance in support of the DoD's global mission. Under the direction of its three Under Secretary of Defense offices, Acquisition, Technology and Logistics; Personnel and Readiness; and Policy, stand-up and implementation activities are on-going.• OASD(HA), through the Armed Forces Health Surveillance Center, funded development and expansion of the central data repository, <i>VectorMap</i>, to support the primary web-based mapping tool for global geographic arthropod vector collection and related disease data to	

Table 2. ACE Assessment Summary (continued)

Passive Defense (continued)
Ongoing Efforts (continued)
<ul style="list-style-type: none"> Defense Acquisition System and awarded contracts to three vendors. The <i>UIPE</i> will provide individual protection capabilities with reduced weight, bulk, and thermal strain. The JPEO-CBD's <i>Joint Service General Purpose Mask (JSGPM)</i> reached more than 500,000 successful fieldings in FY 2012. U.S. Air Force (USAF) modernization for ground crew chemical, biological, and radiological (CBR) respiratory and ocular protection is now complete while JSGPM production and fielding will continue for the U.S. Army and U.S. Navy. In January 2012, a contract was awarded for a second manufacturer of the M61 filter used in the <i>JSGPM</i>. This award injects competition and protects the supply source to support fielding and sustainment. The JPEO-CBD's <i>Joint Service Aircrew Mask (JSAM)</i> program completed production of its <i>Apache Variant (MPU-6)</i>, representing a Total Service Requirement of 2,381 systems. The <i>MPU-6</i> provides head, eye, respiratory, and chemical and biological protection for AH-64 helicopter aircrew. In April 2012, the <i>JSAM Rotary Wing Variant (MPU-5)</i> Capability Development Document was approved, enabling the program to move forward without impacting planned activities. The JPEO-CBD's <i>Joint Effects Model (JEM) Increment 1</i> completed deployment to the USAF, U.S. Army, and U.S. Marine Corps (USMC). In addition, a successful Multi-Service Operational Test and Evaluation with the U.S. Navy was conducted. <i>JEM</i> is a web-based software that provides DoD with an accredited tool to model and simulate the effects of CBRN weapon strikes and incidents effectively. The JPEO-CBD's <i>Joint Warning and Reporting Network (JWARN) Increment 1</i> was fielded to the USMC in conjunction with the <i>Joint Tactical Common Operating Picture (COP) Workstation</i>. <i>JWARN</i> is a computer-based application that incorporates sensor alert information and CBRN observation reports from the field, generates a plot of the hazard area, displays it on the <i>COP</i>, and generates a warning message to units. The Army Acquisition Executive designated JPEO-CBD as the Office of the Secretary of Defense lead for the <i>Global Combating Weapons of Mass Destruction (CWMD) Awareness System (GCAS)</i>. The U.S. Strategic Command (USSTRATCOM) requirement validated by the Vice-Chairman of the Joint Chiefs of Staff envisions a holistic system leveraging existing materiel and non-materiel capabilities and information sources providing a fused global picture of the CWMD operating environment. The JPEO-CBD's <i>Joint Expeditionary Collective Protection (JECP)</i> program conducted a successful operational assessment in August 2012, which provided user feedback to support the Milestone C decision occurring in FY 2013. Milestone C authorizes entry into the Production and Deployment phase of the Defense Acquisition System. <i>JECP</i> will provide Joint expeditionary forces a collective protection capability which is lightweight, compact, modular, and affordable. The <i>JECP</i> products include tent kits, structure kits, and stand-alone shelters that allow the application of a collective protection capability to transportable soft-side shelters, enclosed spaces of opportunity, and remote austere locations as a stand-alone resource. JPEO-CBD responded to USCENTCOM requests and delivered multiple medical and non-medical chemical and biological defense products rapidly into its theater. They provided over 7,000 items of CBRN equipment along with required spare parts to meet urgent and critical needs. In FY 2012, the JPEO-CBD biological point detection team fielded 56 M31A2 <i>Biological Integrated Detection Systems (BIDS)</i>. <i>BIDS</i> is a fully deployable, dual-use system used for contingency operations and homeland defense. The team also fielded 13 M98 <i>Joint Biological Point Detection Systems (JBPDs)</i>, which were installed aboard U.S. Navy ships. The <i>JBPDs</i> is a modular suite of equipment that provides detection, identification, and collection of biological warfare agents in near real-time. JPEO-CBD's <i>Chemical Biological Protective Shelter (CBPS) M8E1</i> completed First Article Testing to support Type Classification/Materiel Release in the 2nd Quarter of FY 2013. Production of the first 38 <i>CBPS M8E1</i> systems began in FY 2012. Production stimulates procurement of long-lead items, streamlines the manufacturing processes, and identifies any issues with the engineering drawings in order to assure the remaining production is free of issues. The JPEO-CBD's <i>Stryker NBC Reconnaissance Vehicle</i> program finished production of 95 sensor suites for the extended low-rate initial production phase and began production of 158 sensor suites for full rate production. The JPEO-CBD successfully evaluated 19 chemical sensors of various technologies against a full spectrum of low volatile chemical compounds in different phases of matter to support the <i>Next Generation Chemical Detector (NGCD)</i> program. Furthermore, the project increased the industrial knowledge base to enable industry to support the <i>NGCD</i> more effectively. The JPEO-CBD achieved a successful Full Rate Production decision to replace the Navy's legacy chemical warfare agent detection system, installed across the entire Naval fleet, with the <i>Improved Point Detection System-Lifecycle Replacement (IPDS-LR)</i>, which provides improved reliability and reduced sustainment costs over its predecessor. The <i>Joint Biological Tactical Detection System (JBTDS)</i> began a competitive prototyping in FY 2012 with systems from multiple vendors in preparation for Milestone B in FY 2013. <i>JBTDS</i> will provide a biological detection capability to detect, collect, and identify biological aerosol hazards to support Mission Oriented Protective Posture decisions and downwind hazard warning at the tactical level. <i>JBTDS</i> will be operable across the full spectrum of operations in multiple environments and support Joint forces during periods of increased biological threat, and during routine biological surveillance operations when integrated in the protection capabilities for fixed sites and forward operating bases. The JPEO-CBD's <i>Contaminated Human Remains Pouch (CHRP)</i> program achieved approval of its Capability Development Document (CDD) in July 2012, validating the Key Performance Parameters contained in the CDD and enabling the program to move forward on schedule. The <i>CHRP</i> will be employed on the battlefield as a means to protect Warfighters from hazards posed by chemical, biological, and radiological

Table 2. ACE Assessment Summary (continued)

Passive Defense (continued)	
Ongoing Efforts	
<ul style="list-style-type: none">contaminated human remains during their recovery from the point of fatality, during transport to the Mortuary Affairs Contaminated Remains Mitigation Site, and during temporary storage of interment.The JPEO-CBD released a Request for Proposals for the <i>Joint Service Equipment Wipe (JSEW)</i> and <i>General Purpose Decontaminant(s) (GPD)</i>, and source selection reviews of industry proposals were completed. Eleven contracts were awarded to successful vendors for test samples to determine their products' ability to meet performance requirements. <i>JSEW</i> will provide immediate (operational) decontamination capability for sensitive and non-sensitive equipment in hostile and non-hostile environments that have been exposed to chemical contamination. <i>GPD</i> will provide thorough decontamination capabilities for tactical vehicles, shipboard surfaces, crew-served weapons, and individual weapons in hostile and non-hostile environments that have been exposed to chemical and/or biological contamination.DTRA/SCC-WMD's Joint Science and Technology Office (JSTO) completed physicochemical characterization of priority NTAs.In FY 2012, the JSTO demonstrated increased survival against non-traditional agent (NTA) insult using adjunct therapy given in combination with the current treatment regimen in non-human primates.In FY 2012, the JPEO-CBD continued its <i>NTA Defense Test System (NTADTS)</i> effort. <i>NTADTS</i> will provide a new test capability to the U.S. Army Edgewood Chemical Biological Center at Aberdeen Proving Ground, featuring a new, large-scale NTA and traditional chemical warfare agent test capability for DoD <i>CBDP</i> commodity items. The facility is expected to be operational by 2015.The Armed Forces Radiobiology Research Institute (AFFRI) identified several radiation biomarkers (distinct biochemical, genetic, or molecular characteristics that indicate particular biological conditions), that are not affected by stress due to physical constraints, which will provide diagnostic indications of partial-body radiation exposure.AFFRI validated the use of the failure rates of two cellular repair mechanisms, intrachromosomal inversion and cytogenetic aberrations, as accurate biomarkers to determine the amount of radiation exposure a patient received. Determining the exposure quantity is a critical task in treating patients exposed to radiation as the clinical course changes with increasing exposure.AFFRI completed the study on the bio kinetics (how a particular compound interacts within the body) of embedded fragments of potential radiological dispersal device materials using nonradioactive surrogates.AFFRI initiated development of an <i>in vitro</i> model system to assess the short and long term effects of inhalation exposure to depleted uranium.AFFRI evaluated radiation countermeasures that act through Toll-Like-Receptor (TRL) ligands (proteins, which identify different types of molecules) for signal transduction (cell to cell communication) pathways.AFFRI evaluated eleven novel radiation countermeasure candidates in mice.AFFRI determined the effect of sampling for time intervals less than 24 hours on changes in relevant baseline blood cell types and biochemical endpoints.AFFRI established and tested dose prediction algorithm using multiple blood cell types.AFFRI showed that genistein, an organic compound in the isoflavonid family that acts like an antioxidant, is not an effective countermeasure when administered after irradiation.AFFRI determined the dose reduction factor for intramuscularly administered genistein in nano-suspension.AFFRI determined the role of cytokines, which are signaling molecules, as a mechanism for radiation protection for intramuscularly delivered genistein. DHS, DoD, and the DHHS, using the appropriate requirements process, or other jointly-agreed process, develop solutions for WMD passive defense gaps/shortfalls.Finalize the draft DoD/DHHS MOU to increase collaboration on medical countermeasure development between the OASD(NCB/CB) and the DHHS Biomedical Advanced Research and Development Authority (BARDA).In addition to current OASD(NCB/CB) engagement, DoD should continue to collaborate with DHHS through engagement in reinventing MCM manufacturing. DoD is focusing on advanced development and manufacturing technologies in its <i>Medical Countermeasures Initiative (MCI)</i>, while DHHS is focusing on advanced development and manufacturing services to protect the nation and facilitate surge capacity as needed in an emergency.The OASD(NCB) Biosurveillance Matrix Team recommend courses of action to inform senior leadership on ways to identify emerging threats and hazards rapidly and efficiently.Emphasize development of new laboratory technologies that reduce the time required to conduct multiplex assays.Develop approaches to promote early notification and warning of release of non-traditional agents.Investigate new detection methods that identify common pathogenic mechanisms or properties of biological agents.Develop advanced sensors and techniques, including higher resolution detectors and more efficient analysis algorithms.Improve methods and technologies for detecting secondary products or surrogate signatures of special nuclear materials.Continue efforts to transition mobile laboratory capabilities for analyzing samples to identify non-traditional chemical agents.Continue to investigate the operational viability and performance of distributed sensor networks.	

Passive Defense (continued)	
Recommendations	
<ul style="list-style-type: none"> • Continue procurement of collective protection systems and R&D for integration of protective fabrics into existing shelters. • Develop detector materials and systems to locate and identify nuclear/radiological materials at stand-off distances. • Improve portability of CBRNE-sensor systems by leveraging both commercial and government-developed sensor technologies. • Continue development of investigational new drugs using broad spectrum approaches against viruses and bacterial pathogens • Continue efforts to integrate and coordinate U.S. international partnering activities to reduce duplication. • Expand WMD threat-awareness outreach and technical reachback efforts to state and local authorities through intelligence-fusion centers and other information sharing initiatives. • Expand efforts to provide indicators to state and local law enforcement officials to recognize and report suspicious activities that may involve WMD materials, devices, components, and infrastructure. • Expand efforts to conduct joint threat analysis with state and local analysts to characterize events. • Improve capability for rapid CBRN detection, identification, and characterization, including at standoff distances. 	
Security Cooperation and Partner Activities	
Goals	
<ul style="list-style-type: none"> • Provide technologies and systems to monitor and verify global regimes restricting the production, storage, and testing of WMD, WMD-related materials, and components. • Integrate CWMD into the traditional Security Cooperation framework. • Build partner capacity to prepare, prevent, protect, respond, and recover from WMD threats. • Develop, implement, and support focused cooperative activities, particularly research and development between the United States and its international partners to improve their capabilities to combat WMD. • Secure, control, monitor, and track WMD materials and related components through increased commitments from foreign governments. 	
Ongoing Efforts	
<ul style="list-style-type: none"> • Continue assessments and support of critical treaty-verification technology programs. • Geographic COCOMs expand cooperative defense efforts to counter WMD in their areas of responsibility • In response to Department of State requests, JPEO-CBD has successfully delivered several Non-Intrusion Inspection capabilities to Iraq. 	
Recommendations	
<ul style="list-style-type: none"> • DOS and DoD, using the appropriate requirements process, or other jointly-agreed process, develop solutions for Security Cooperation and Partner Activities gaps/shortfalls. • Improve detection of nuclear materials and activities at nuclear facilities to distinguish between legitimate and proliferation-related activities. • Continue to expand partnership activities to improve regional interoperability and counter WMD capabilities 	
Offensive Operations	
Goals	
<ul style="list-style-type: none"> • Detect and identify targets. • Conduct decisive operations to employ offensive capabilities against in-transit, fixed, or WMD-related targets or infrastructure with little or no collateral effects. • Assess engagements. • Deter potential adversaries through significant WMD defeat capabilities as a viable response to WMD use or threats against the United States, its friends, or allies. • Continue support and progress in the <i>Nuclear Forensics Expertise Development Program</i>. 	

Table 2. ACE Assessment Summary (continued)

Offensive Operations (continued)	
Ongoing Efforts	
<ul style="list-style-type: none"> Continued development of strike capabilities to include capability for conventional prompt global strike. The USAF has taken deliveries of the <i>Massive Ordnance Penetrator (MOP)</i> and <i>BLU-119/B (CrashPAD)</i> with shelf life extended to 2021 and aircraft flight clearances renewed. Efforts are also underway to improve modeling of strikes against WMD targets including integration of the Air Force's <i>Simulation Environment & Response Program Execution Nesting Tool (SERPENT)</i> into DTRA/SCC-WMD's <i>Integrated Munitions Effects Assessment (IMEA)</i>. The DTRA/SCC-WMD Counter WMD Technologies Department, J9-CX, is developing and transitioning technologies to enhance WMD-defeat planning tool prediction capabilities (facility progressive collapse, internal blast effects) used in offensive operations decision-support systems. 	
Recommendations	
<ul style="list-style-type: none"> <u>Using</u> the appropriate requirements process, develop solutions for WMD offensive-operations gaps/shortfalls. Improve intelligence gathering, analysis, and fusion (e.g., information management systems, decision support systems, sensor development, intelligence analysis capacity, and technical expertise) regarding State and non-State WMD proliferation and development activities. Conduct research and development for capabilities to improve conventional prompt global strike. Tailor investment in hard and deeply buried target defeat (HDBTD) capabilities to objective criteria defined in the <i>HDBTD Mission Area ICD</i>. Improve fidelity and reliability of predictive tools for design and development of optimized weapons and concepts through rock, soil, and other structures. Explore kinetic and non-kinetic options for defeating WMD agents/materials with little to no collateral effects. Perform tests against chemical and biological agent simulants to understand better hazards resulting from strikes against chemical and biological targets. 	
Active Defense	
Goals	
<ul style="list-style-type: none"> Continue to develop and field a single, integrated, layered <i>Ballistic Missile Defense System (BMDS)</i> to protect the United States, its deployed forces, and its allies and friends against ballistic missiles at all ranges and in all phases of flight. Maintain and sustain an initial capability to defend the United States, its deployed forces, and its allies and friends against limited ballistic missile attack. Develop and field an integrated cruise-missile defense capability and an unmanned aerial vehicle (UAV) defense capability. Enable U.S. forces to neutralize WMD threats worldwide—be they from national military programs, paramilitary organizations, or terrorists—by means of specially-developed capabilities. Develop options to dissuade current rogue state and near-peer threats. 	
Ongoing Efforts	
<ul style="list-style-type: none"> JPEO-CBD provides U.S. Special Operations Command (USSOCOM) support and implemented the ASD(NCB) memo dated April 12, 2012, executing for the rapid development and acquisition of Special Operations Forces required capabilities. There are 25 <i>Aegis</i> BMD-capable ships and over 90 SM-3 missiles in the U.S. Navy with plans to increase in future years (as of September 30, 2012). Missile Defense Agency (MDA) fielded two <i>Terminal High Altitude Area Defense (THAAD)</i> batteries to the U.S. Army for short and mid-range missile defense. MDA completed a successful demonstration of an integrated <i>BMDS</i>. Using <i>PATRIOT</i>, <i>THAAD</i>, and <i>Aegis</i> weapon systems, the largest, most complex missile-defense flight test ever was accomplished resulting in the simultaneous engagement of five (short and mid-range) ballistic missile and cruise missile targets. 	
Recommendations	
<ul style="list-style-type: none"> Using the appropriate requirements process, develop solutions for WMD active defense gaps/shortfalls. Continue to develop comprehensive ballistic, cruise-missile, and UAV-defense capabilities using a test-validated and sustainable building block approach. 	

Table 2. ACE Assessment Summary (continued)

WMD Consequence Management	
Goals	
<ul style="list-style-type: none"> Provide integrated material solutions to enable Joint Force Commanders and others to respond, mitigate, and restore services in a post-engagement scenario characterized by damage and collateral hazard from CBRN incident inside or outside the continental United States (OCONUS). Develop processes and systems to ensure effective communication and coordination with domestic authorities. Provide specialized expertise, operational personnel, or capabilities to the U.S. homeland or friendly nations, as required, to respond to attacks or disasters associated with WMD. 	
Ongoing Efforts	
<ul style="list-style-type: none"> The <i>Improvised Nuclear Device (IND) Response and Recovery Program</i> developed and is implementing the <i>DHS Strategy for Improving the National Response and Recovery from an IND Attack</i>. It works to align interagency roles and missions for response and recovery to an IND. The <i>Prepositioned Equipment Program</i> is a national asset established after the events of September 11, 2001 to provide immediate support to first responders in the event of a WMD incident, bringing equipment in the form of standardized caches of emergency equipment, protective gear, and medical supplies. DTRA/SCC-WMD is serving as the lead agency for the <i>NTNF Joint Capability Technology Demonstration (JCTD)</i>. Several successful operational demonstrations/exercises and operational utility assessments were conducted in FY 2012, with transition of its capabilities to the U.S. Army and U.S. Air Force scheduled to be completed in the 1st Quarter of FY 2014. The <i>Integrated Yield Determination Tool (IYDT)</i> is a related piece of the <i>NTNF JCTD</i> and is also a part of <i>DISCREET OCULUS (DO)</i>. <i>DO</i> started in March 2010 and is programmed through its operational transition in 2016. <i>DO</i> contributes the sensor system that will provide the data for the <i>IYDT</i> operation. DoD completed restructure of the domestic CBRN-response force to enhance responsiveness and life-saving capability. DoD implemented domestic regional planning and integrated preparedness programs and continues to encourage government at all levels to engage in long-term-recovery planning The <i>CBRN Response Enterprise</i> for domestic consequence management reached full operational capability on October 1, 2012. In all, 55 WMD-CSTs, 17 CBRN Enhanced Response Force Packages, 10 Homeland Response Forces, the Defense CBRN Response Force, and two C2 CBRN Response Elements standby to assist the response to a domestic CBRN incident. The JPEO-CBD rapidly fielded more than \$47 million in CBRN protection, search and rescue, and mass decontamination-capable equipment for the Defense CBRN Response Force and C2 CBRN Response Elements, which carry out life-saving enabling tasks as part of the <i>CBRN Response Enterprise</i>'s support of civil authorities. The JPEO-CBD collaborated with the DoD Office of the Assistant Secretary of Defense for Homeland Defense & America's Security Affairs and the CBP to transfer retrograded DoD capabilities (excess equipment) to the CBP for the purpose of improved homeland security. The intent of this initiative is to lower overall equipment procurement costs for the government while facilitating reuse of excess capabilities across a broader spectrum of USG agencies. The DoD <i>CBDP</i> continues to provide leadership and oversight within the CBRN Enterprise and U.S. Forces Korea for the planning and execution of <i>ABLE RESPONSE</i>, an annual combined Republic of Korea (ROK)-U.S. Joint and interagency exercise that applies a 'whole-of-government' approach to strengthen the ROK-U.S. capability to prepare for and respond to a naturally-occurring or intentional biological incident on the Korean peninsula. <i>ABLE RESPONSE</i> 2012 was held at the Korean Institute for Defense Analyses in Seoul, Korea, with 45 senior leaders and more than 200 participants from ROK, U.S., and Australian Governments. The JPEO-CBD is developing the <i>BIOSURVEILLANCE (BSV)</i> program, which will deliver a set of capabilities to acquire, integrate, and analyze clinical, environmental, and incident management data using existing and next generational systems, medical and non-medical sample collection tools and devices. These will be explored in the <i>Joint U.S. Forces Korea Portal And Integrated Threat Recognition (JUPITR)</i> Advanced Technology Demonstration (ATD) in FY 2013-2015 and support the Material Development Decision(s). In FY 2012, several new therapeutic candidates that can reverse the toxic effects of nerve agents on the brain were developed and tested. These "centrally-active" compounds are promising leads for treatments that will protect Warfighters from immediate and long-term effects of nerve agent exposure. Additionally, the manufacturer of the active component of the drug used in the JPEO-CBD's <i>Advanced Anticonvulsant System</i> developed to treat nerve agent exposure, achieved FDA Orphan Drug designation. This designation was sought to both save an estimated \$2.3M and to more rapidly achieve FDA approval consistent with current law. In 2012, the Army Acquisition Executive designated the JPEO-CBD's Joint Project Manager Guardian, as the <i>Integrated Base Defense (IBD)</i> program lead to synchronize and coordinate <i>IBD</i> acquisition activities across the Program Executive Offices. <i>IBD</i> provides an overarching concept of force protection encompassing an Enterprise Architecture that is scalable between fixed-site, semi-fixed / expeditionary, and mobile (deployable force protection) leading to improved information management, fusion, automation, and integration. 	

Table 2. ACE Assessment Summary (continued)

WMD Consequence Management (continued)	
Ongoing Efforts (continued)	
<ul style="list-style-type: none"> • In FY 2013-2014, the <i>Joint Biological Agent Decontamination System (JBADS)</i> will demonstrate biological decontamination of a C-130 interior and exterior with heat and humidity in a thermal decontamination containment system. The JCTD will transition the capability at the end of FY 2014. • The DOE/NNSA Office of Emergency Response's (NA-42) near- and mid-term efforts include improving the ability to model, monitor, and assess the effects of radiological or nuclear incidents rapidly. Based on lessons learned from the response to the Fukushima, Japan nuclear power plant accident, NA-42 is improving its hardware infrastructure and software to conduct atmospheric dispersion modeling. Also in the near-term NA-42 is improving its capability to deploy a seamless, electronic process for collecting and delivering assessed radiological data to decision-makers. NA-42 will exercise with the DoD and other relevant agencies to enhance our ability to support the response following a nuclear or radiological incident. • AFFRI released the beta version of <i>Windows First Responder Radiation Assessment Tool (WinFRAT)</i> online. 	
Recommendations	
<ul style="list-style-type: none"> • DHS, DoD, and DHHS, using the appropriate requirements process, develop solutions for WMD consequence management gaps/shortfalls. • Continue research in the medical/genomics field. • Develop improved individual protection capabilities. • Establish a readiness and training reporting system for installation protection. • Develop and expand joint-service, multi-service, and interagency Consequence Management doctrine. • Continue to improve DoD's <i>CBRN Response Enterprise</i> support to primary federal agencies. • Develop integrated and evaluated plans and procedures for Technical Nuclear Forensics collections operations with National WMD Response operations. • Continue to refine DoD's <i>CBRN Response Enterprise</i> to improve responsiveness and life-saving capabilities. 	
Intelligence	
Goals	
<ul style="list-style-type: none"> • Acquire high-value intelligence to support U.S. policies and actions to dissuade, prevent, rollback, deter, mitigate, and manage the consequences of WMD. • Provide planning, integration, and improvements to USG nuclear forensics capabilities. • Develop capability for robust assessments for attribution of CW or biological weapon (BW) alleged use. • Provide improved intelligence to support Administration policy goals to secure dangerous nuclear materials worldwide. • Improve information-sharing among CWMD community members. • Implement the use of predictive analysis to scope and scale WMD problems and inform intelligence collection planning, force management decisions, and capability development. 	
Ongoing Efforts	
<ul style="list-style-type: none"> • Work with IC and government partners, including international allies, to improve intelligence capabilities across the full spectrum of policy objectives. • Ongoing collaborative working relationships between DND, DOE, DTRA/SCC-WMD, and the FBI within the National Technical Nuclear Forensics Center. • Ongoing development of the <i>Biodefense Knowledge Management System (BKMS)</i> at the DHS Biodefense Knowledge Center. 	
Recommendations	
<ul style="list-style-type: none"> • DHS and DoD, using the appropriate requirements process, develop solutions for WMD-intelligence gaps/shortfalls. • Coordinate and publish a revised <i>National Intelligence Plan for Countering WMD Proliferation</i>. • Develop next-generation pattern analysis tools to support the identification of nuclear forensic signatures. • Initiate international discussions to develop memoranda of understanding for pathogenic strains. • Lead and coordinate efforts to develop a pipeline of nuclear forensics experts. 	

COMBATING WMD PERSPECTIVES OF CPRC MEMBER ORGANIZATIONS

The WMD threat, combined with the existence of potentially unsecured WMD materials, technology, or knowledge in regions of concern, is among the most serious security challenges facing the United States. The CWMD activities of CPRC member organizations are integrated; however each member organization has separate responsibilities for CWMD.

Department of Defense

DoD's Combating WMD activities include an integrated approach across all three pillars of the *National Strategy to Combat Weapons of Mass Destruction*. DoD is pursuing an integrated CWMD approach with a combination of nonproliferation, counterproliferation and consequence management activities. DoDD 2060.2 establishes policy, assigns responsibilities, and formalizes relationships among the DoD Components under the DoD mission to combat WMD.

Per DoDD 2060.2, the Office of the Under Secretary of Defense for Policy (USD(P)) develops, coordinates, and oversees the implementation and integration of DoD combating WMD policy through the Assistant Secretary of Defense for Global Strategic Affairs (ASD(GSA)) and as the policy pertains to homeland defense activities, through the supervision of the Assistant Secretary of Defense for Homeland Defense and the America's Security Affairs (ASA(HD&ASA)). The ASD(GSA) is the single point of contact for the Office of the USD(P) for combating WMD. It has responsibilities to:

- Oversee development of international partnership capacity to combat WMD.
- Represent and advocate DoD combating WMD requirements and capabilities, when required, in the interagency process.
- Integrate combating WMD policy with other DoD and national policies and strategies.
- Support Combatant Commander combating WMD planning and execution activities.
- Develop, coordinate, and oversee the implementation of policy on all matters pertaining to the roles, missions, capabilities, and employment of SOF in combating WMD.

The Commander of U.S. Strategic Command (USSTRATCOM) synchronizes planning for DoD CWMD efforts in coordination with other combatant commands, Services, and other agencies. The Commander of USSTRATCOM is responsible for other functions including coordinating CWMD operations support, developing a CWMD concept of operations, and advocating for CWMD capabilities. These functions are delegated to the USSTRATCOM Center for CWMD (SCC-WMD). The Director of SCC-WMD, is also dual-hatted as the Director of the Defense Threat Reduction Agency (DTRA). DTRA is both a defense agency and combat support agency providing DoD's core intellectual, technical, and operational support expertise for countering threats posed

by WMD. SCC-WMD leverages the people, programs, and interagency relationships of DTRA at a strategic level. DTRA/SCC-WMD developed the following priorities:

- Implement the Nunn-Lugar Global Cooperation Program.
- Implement President Obama's arms control vision.
- Develop analytical tools and technology to detect and acquire, or actively confront, the full spectrum of WMD threats.
- Develop a robust reach-back capability to facilitate the USG's counterproliferation efforts.
- Provide operational and technical support to ensure the safety, security, and sustainability of the U.S. nuclear weapons stockpile.
- Support Combatant Commands in their efforts to respond to WMD threats.

Additionally, per DoD Directive S-2060.04, DTRA/SCC-WMD is tasked to "Manage DoD *National Technical Nuclear Forensics (NTNF)* research and development (R&D) programs, and coordinate *NTNF* R&D programs with the Secretary of the Air Force and other DoD and non-DoD *NTNF*-relevant R&D activities."

In support of USSTRATCOM's role as the synchronizer, DTRA/SCC-WMD had a mandate to, and had established the CWMD Global Synchronization Conference as a collaborative venue and agenda to educate, discuss, and identify gaps, seams and opportunities. This was a semi-annual conference to act as a conduit to facilitate cooperation and support the day-to-day engagement between staffs and action officers that is the basis for coordinated CWMD efforts. The agenda was focused on near-term CWMD issues affecting the CWMD community (i.e. U.S. Geographical Combatant Commanders (GCC), the Joint Staff, the Office of the Secretary of Defense, and the interagency) that: 1) are workable within 6-24 months, 2) by action officers, 3) with senior leadership (3-star) support. This was an agile forum for solving problems with little bureaucracy. In addition, DTRA/SCC-WMD has brought in their Key Partner nations (i.e., Australia, Canada, and the United Kingdom) to participate. In response to sequestration and resulting budget constraints for conferences, two semi-annual conferences in 2012 and 2013 were cancelled. In response, this activity has been revised to be conducted as a series of Webinars to fulfill the USSTRATCOM requirements as a synchronizer. Once funding constraints for conferences of this nature are removed, DTRA/SCC-WMD will resume its plan of conducting regular participatory conferences, tentatively scheduled for January and July of 2014.

The DoD *CBDP* supports the CWMD community by enabling the Warfighter to deter, prevent, protect against, mitigate, respond to, and recover from CBRN threats and their effects as part of a layered, integrated defense. The DoD *CBDP* mission encompasses support to the Joint Force across the range of military operations (to include conventional, irregular, and homeland defense). In support of the CWMD community, the DoD *CBDP* has the lead role within the DoD in conducting Research, Development, and Acquisition (RDA) for chemical and biological (CB) defense material and nonmaterial solutions for the Joint Force.

The DoD *CBDP* efforts are structured along the operational element functional concepts of Sense, Shape, Shield, and Sustain¹. Within this construct, the DoD *CBDP* is focusing efforts in four areas essential for a robust defense:

- **Medical Countermeasure (MCM) Development:** The DoD invests in MCMs to pre-treat, protect, and treat the Warfighter against CB threats. Several federal agencies collaborate to deliver MCMs to those affected at the right time in adequate supply. The DoD is focused on protecting forces against disease in theaters of operation and against weaponized CB threats.
- **Diagnostics:** The DoD invests in chemical, biological, and/or, radiological (CBR) detectors and diagnostics to protect the Warfighter by quickly and effectively identifying, characterizing, and diagnosing pathogens and diseases to inform timely and appropriate treatment.
- **Biosurveillance:** The DoD is investing in a biosurveillance capability that will mitigate the threat from CBR events (intentional, accidental, or naturally occurring) by informing leadership with essential information to support decision-making in a timely manner through a technical architecture made up of disease surveillance tools, to include fielding capable diagnostic, detection, and information management and analytics technologies.
- **Non-Traditional Agent (NTA) Defense Capabilities:** The DoD continues investments in NTA defense capabilities in support of Warfighter and our broader national security objectives. In support of the National NTA Defense RDT&E Strategy, dated October 2010, efforts are underway to provide and enhance capabilities to mitigate the threat from non-traditional and emerging chemical threats. The DoD is committed to developing NTA defense capabilities in our priority areas of detection, MCMs, decontamination, and protection.

The Commander of U.S. Special Operations Command (USSOCOM) has the responsibility to develop and maintain an outside-the-continental-United States (OCONUS) WMD counterproliferation capability, and will develop and implement special operations to combat WMD military activities, in coordination with the appropriate GCCs and the Commander of USSTRATCOM. Further, the Commander is responsible for synchronizing planning for global operations against terrorist networks, and will do so in coordination with other combatant commands, the Services, and, as directed, appropriate USG agencies—specifically, preventing the development, acquisition, and use of WMD by a violent extremist organization.

¹ The DoD *CBDP* provides the following definitions:

Sense assets allow the DoD to continuously provide information about the CBRN situation by detecting, identifying, and quantifying CBRN hazards in air and water and on people, equipment, and the ground. **Shape** assets provide the ability to characterize CBRN hazards for the force commander by collecting, querying, and assimilating information from sensors, and intelligence, medical and other sources. This information is used to help predict future CBRN situations, determine the potential impacts of CBRN hazards, and conduct operations. **Shield** assets allow the DoD to protect the Force from harm and operational degradation caused by CBRN hazards. Shield assets prevent or reduce individual and collective exposures to CBRN hazards, prevent or mitigate physiological effects caused by exposure to hazards, and protect critical equipment. **Sustain** assets provide the DoD with the ability to conduct medical and contamination mitigation actions in order to quickly restore combat power, essential functions, and operations.

Department of Energy

One of DOE's primary goals is to enhance nuclear security through defense, non-proliferation, and environmental efforts. The National Nuclear Security Administration (NNSA) is the DOE agency responsible for addressing the following four principal objectives:

- *Maintain the U.S. nuclear deterrent while working toward a world free of nuclear weapons.* The DOE will maintain a safe, secure, and effective U.S. nuclear stockpile.
- *Stem nuclear proliferation and lead an international effort to secure and eliminate, where possible, vulnerable materials worldwide.* In the context of reducing global nuclear dangers, the DOE will enhance nonproliferation efforts and the security of nuclear materials, and support the President's arms-control and nonproliferation agendas.
- *Reduce the threat of nuclear and radiological terrorism and increase international engagement on nuclear security matters.* The DOE will leverage its expertise in the analysis of foreign nuclear-weapons programs and novel technologies to assess the potential of emerging nuclear threats and countering the threat of nuclear terrorism. Strengthen international capacity to deter, prevent, and manage the consequences of WMD terrorist attacks by working through international partnerships and organizations such as the Global Initiative to Combat Nuclear Terrorism, the Group of Eight (G8) Global Partnership, and the International Atomic Energy Agency (IAEA).
 - Within the NNSA, the responsibility for countering nuclear terrorism resides principally in the Office of Counterterrorism and Counterproliferation (NA-80). Established in 2011, NA-80's purpose is to advance this mission by enhancing the government's technical understanding of the terrorist nuclear threat, as well as advocating for technically informed policies across the interagency community.
- *Mitigate the proliferation risk associated with nuclear-power deployment and fuel-cycle engagement.* Through research and development, the DOE will strengthen international safeguards and export controls to support safe and secure deployment of nuclear power.

Department of Homeland Security

The Quadrennial Homeland Security Review Report: A Strategic Framework for a Secure Homeland (February 2010) establishes three key concepts that form the foundation for our national homeland-security strategy: Security, Resilience, and Customs and Exchange. These concepts drive three broad areas of activity defined as homeland-security core missions. Its CWMD-related areas of activity are:

- **Preventing Terrorism and Enhancing Security:** Incorporates understanding of the threat; preventing unauthorized acquisition or use of CBRN materials and capabil-

ties; and understanding and prioritizing risks and reducing vulnerabilities of critical infrastructure and government.

- Securing and Managing Our Borders: Includes preventing illegal entry, export, or exit of weapons; protecting against cross-border threats to health, food, environment, and agriculture; identifying and disrupting illicit pathways used by transnational terrorist and criminal groups.
- Ensuring Resilience to Disasters: Incorporates mitigation of hazards, enhancement of preparedness, promotion of effective emergency-response capabilities, and improvement of capabilities to recover and sustain essential services and functions.

The DHS S&T Directorate and Office of Health Affairs (OHA) continue to assess, develop, and deploy capabilities targeted against the use of CB agents. Efforts lie primarily in the passive defense and consequence management domains and are consistent with obligations and guidance outlined in Homeland Security Presidential Directives 10 (BioDefense for the 21st Century), 18 (Medical Countermeasures against Weapons of Mass Destruction), 21 (Public Health and Medical Preparedness), and 22 (National Domestic Chemical Defense) as well as Presidential Policy Directive 2 (National Strategy for Countering Biological Threats). Department priorities in CB defense include characterizing threats and risks, detecting and responding to the release of CB agents, and assisting other agencies in developing approaches to enhance recovery from contamination by CB agents. Defense against biological agents and disease caused by them are accorded highest priority due to the potential consequences from effective attacks with such agents or from pandemic disease. An emerging investment area with significant crossover to the public health domain is biosurveillance, which seeks to extract meaningful early indications of disease caused by CBR agents, regardless of source or intent, and to aid in directing response and mitigation efforts against such disease. DHS efforts in defense against CB agents and the disease they cause are coordinated with other agencies through various mechanisms: the CB Defense MOU with DoD and the U.S. Environmental Protection Agency; chemical and biological defense subcommittees organized under the President's National Science and Technology Council (Committee on Homeland and National Security); the DoD-DHS Capabilities Development Working Group; and a number of other collaborative fora. The DHS S&T Directorate maintains active cooperative agreements with many international government partners. These agreements are utilized by other DHS components and other US government agencies to enable broadly cooperative efforts across our allies.

Department of State

WMD in the possession of terrorists or hostile states constitutes a serious and immediate threat. DOS will devote significant resources to counterproliferation, counterterrorism, nonproliferation, verification, compliance enforcement, and consequence management. These resources support DOS efforts to:

- Prevent the acquisition of WMD by terrorists and hostile States.

- Contribute to the international effort to secure, remove, and eliminate WMD, their delivery systems, related materials, and expertise through diplomacy, foreign assistance, counterproliferation, and counterterrorism efforts.
- Build coalitions to interdict proliferation trade, disrupt financing, and punish violators.
- Strengthen our common capacity to deter, prevent, and manage the consequences of WMD terrorist attacks by working through international partnerships and organizations such as the Global Initiative to Combat Nuclear Terrorism, the Group of Eight (G8) Global Partnership, the Organization for the Prohibition of Chemical Weapons (OPCW), and the International Atomic Energy Agency (IAEA).
- Strengthen other countries' export and border-security controls to detect and interdict the illicit movement of WMD.
- Roll back hostile nuclear-weapons programs, including working with the IAEA to deny States the ability to pursue nuclear weapons under the cover of peaceful nuclear energy programs.
- Support existing arms control and nonproliferation agreements and verification protocols, and work with international partners to strengthen their implementation and ensure their compliance.
- Support cooperative efforts to develop missile defenses.

The Intelligence Community

The IC concentrates its CWMD activities on acquiring high-value intelligence to support U.S. policies and actions that discourage, prevent, rollback, deter, and mitigate the consequences of WMD. The CBRN Counterterrorism Group (CCTG)—formed by merger of the Central Intelligence Agency (CIA) Counterterrorism Center's and National Counterterrorism Center's (NCTC) CBRN analysis groups—pools scarce analytical experts from CIA, NCTC, Defense Intelligence Agency (DIA), Federal Bureau of Investigation (FBI), and other USG organizations to support a wide range of customers. Additional CPRC members' CWMD perspectives are presented in Volume II, Section 4.

The National Counterproliferation Center (NCPC), founded in 2005 within the ODNI, helps the U.S. to counter the threats caused by the proliferation of CBRN weapons. NCPC works with the IC to identify critical WMD knowledge gaps and develop and implement strategies and solutions to reduce or close those gaps. With the policy community, NCPC also helps to identify long-term proliferation threats and counterproliferation requirements, and develops strategies to ensure that the IC is positioned to address these over-the-horizon threats. To do this, NCPC depends not only on the 17 IC agencies and departments, but also on the partners inside and outside the USG, including experts in academia and the private sector.

FUNDING OF CPRC-REPORTED PROGRAMS

Improving the Nation's capabilities to meet and respond to the threat of WMD requires continued and substantial investment throughout many USG organizations. This report includes appropriations for more than \$36.3 billion in FY 2011 and \$36.3 billion in FY 2012, and planned investment of \$35.1 billion in FY 2013 and \$32.3 billion in FY 2014 from DoD, DOE, DOS, and DHS. The IC's total investment in CWMD is not included in these CPRC-reported summary figures due to the classification associated with the IC budget, but there are some portions of the IC budget reported in Volume II. FY 2013 and FY 2014 figures are consistent with the respective President's Budgets. More detailed budget information on DoD, DOE, DOS, IC, and DHS programs is presented in Volume II, Chapter 4 and Appendix C.

2013 CPRC RECOMMENDATIONS

Recommendation 1: Strengthen Counter Nuclear Threat Capabilities

Develop, test, and deploy improved capabilities (both kinetic and non-kinetic) to prevent illicit or unauthorized development, acquisition, and use of nuclear and radiological materials out of regulatory control, regardless of origin. Strengthen medical countermeasures to eliminate vulnerabilities.

Applicable ACEs: Passive Defense, Interdiction, Offensive Operations, Elimination, WMD Consequence Management, Active Defense, Intelligence, Threat Reduction Cooperation

DoD identified the need to achieve enhanced levels of agility and flexibility so it can better anticipate WMD threats, overcome technological surprise, and quickly adapt to support changing military missions and regional priorities, such as those outlined in the President's strategic guidance document, *Sustaining U.S. Global Leadership: Priorities for 21st Century Defense, January 2012*, and the *2006 National Military Strategy for Combating Weapons of Mass Destruction*. To succeed at both the tactical and strategic levels, we must foster a rapid, coordinated, and effective nuclear counterterrorism (CT) effort that reflects the full capabilities and resources of our entire government. That is why *The National Strategy for Counterterrorism (June 2011)* integrates the capabilities and authorities of each department and agency, ensuring that the right tools are applied at the right time to the right situation in a manner that is consistent with U.S. laws.

- Work with partners around the world to prevent theft, loss, smuggling, and terrorist use of nuclear and radiological materials.
- Identify, target, and disrupt terrorist networks that engage in nuclear-related activities.
- Secure nuclear materials.
- Develop and implement policies, procedures, and programs to prevent illicit trafficking of nuclear-related materiel.
- Provide multilateral nonproliferation organizations with the resources, capabilities, and authorities they need to be effective.
- Deepen international cooperation and strengthen institutions and partnerships that prevent nuclear materials from falling into the hands of terrorists.
- Develop processes and programs for agile and flexible platforms and broad-spectrum medical countermeasures research, development, and procurement against radiological and nuclear threats.

- Develop, test, and deploy capabilities for improved nuclear forensics in support of national attribution efforts, including improvements in coordination among national and local organizations.
- Counter terrorism through continued enhancement and implementation of science and technology programs that tag, track, and locate (TTL) nuclear and radiological materials.
- Continue developing recommendations for S&T investment areas to improve DoD's ability to counter the threat of terrorist acquisition and use of a nuclear weapon within the Priority Steering Council, under the Assistant Secretary of Defense for Research and Engineering and the Assistant Secretary of Defense for Nuclear, Chemical, and Biological Defense Programs (ASD(NCB)).
- For some situations such as non-permissive environments, shift the paradigm of searching for lost/stolen nuclear material from looking for radiation signatures to searching instead for signatures of the people, networks, communications, financial transactions, movements, etc. associated with a radiological or nuclear plot in the planning stage.
- Study and assess the attractiveness of various nuclear and high explosive materials that may be used in INDs.
- Develop tools, techniques, and procedures to render safe INDs.

Recommendation 2: Build agility in Chemical and Biological (CB) defense capabilities, procedures, and policies to respond to technological surprise

Develop, test, and preposition the capability to detect, characterize, and respond quickly to unknown and unpredicted CB threats.

Applicable ACES: Passive Defense, WMD Consequence Management, Intelligence, Offensive Operations

The DoD identified the need to achieve enhanced levels of agility and flexibility so it can better anticipate CBRN threats, overcome technological surprise, and quickly adapt to support changing military missions and regional priorities, such as those outlined in the President's strategic guidance document, *Sustaining U.S. Global Leadership: Priorities for 21st Century Defense, January 2012*, and the *2006 National Military Strategy for Combating Weapons of Mass Destruction*. Outbreaks of naturally occurring communicable and non-communicable diseases of concern, as well as exposure to genetically engineered biological weapons or non-traditional agents (NTAs) can be threats to homeland security and our Warfighters, whether forward-deployed or at home.

- Explore approaches that are adaptable and agile to improve the capability to identify and characterize an exposure rapidly and to treat those infected with new and/or emerging biological threats or chemical exposures.
- Explore the potential for developing a global, rapidly deployable system of scalable laboratories designed to operate in environments from permissive to non-permissive, including the deployment of a mobile detection and diagnostic capability that provides rapid agent/pathogen characterization and analysis suitable for attribution and threat determination.
- Develop, test, and deploy capabilities for improved CB forensics in support of national attribution efforts, including improvements in coordination among national and local organizations.
- Develop adaptable platform technologies and broad-spectrum medical countermeasures that effectively counter emerging, genetically engineered, and/or unknown threats.
- Streamline testing, evaluation, and regulatory requirements to validate medical countermeasures that address emerging threats.
- Develop plans, policies, and technologies to respond effectively to unforeseen and unknown CB threats for military and domestic response operations.

Recommendation 3: Strengthen Cyber Defense Capabilities relative to CWMD

Develop, test, and deploy improved cyber defense capabilities to defeat current and emerging cyber threats to CWMD capabilities and enhance our ability to deter, prevent, and respond to future cyber intrusions.

Applicable ACES: Passive Defense, Interdiction, Offensive Operations, Elimination, WMD Consequence Management, Active Defense, Intelligence, Threat Reduction Cooperation, Security Cooperation and Partner Activities

State-based and non-State cyber actors continue to seek to gain unauthorized access to and potential control over critical national security assets. Left unchecked, CWMD systems will become increasingly vulnerable to cyber-attacks. For example, communications, computers, telemetric data, and software are essential elements in ballistic missile defense operations. The examination of cyberspace threats and vulnerabilities across all nine Areas for Capability Enhancement may contribute to the development of new tactics, techniques, and procedures (TTPs) for countering cyber intrusions and address cybersecurity vulnerabilities and issues in the CWMD mission space.

Recommendation 4: Build Partner Capacity and improve Partner Capabilities for Countering WMD

(NOTE: This is a carryover and expansion of a recommendation from the 2011 CPRC Report to Congress.)

Support research, development, testing, and deployment of improved partner capacity and capabilities to counter WMD threats, including enhanced global CBRN surveillance, detection, warning, and reporting.

Applicable ACES: Threat Reduction Cooperation, Security Cooperation and Partner Activities, Passive Defense, WMD Consequence Management, Intelligence, Active Defense

In increasingly resource-constrained environments the United States will be less able to accomplish the CWMD mission alone. Therefore, international cooperation is needed, when possible, for improving partnership capacity and capabilities, including cooperative research, development, test, and evaluation (RDT&E) efforts. International involvement in RDT&E projects has the secondary effect of enhancing global preparedness and resilience against WMD threats, enabling swift defeat of threats, enhancing partner capability and capacity to counter WMD, and can also serve as an effective deterrent to enemy use.

- Support efforts, including RDT&E, of partner countries to advance medical, public health, and agricultural and veterinary systems' capabilities to respond to and recover from WMD events.
- Improve partner countries' laboratory infrastructure and capabilities, enabling many activities including contributions to U.S. combating WMD efforts, to include biosurveillance.
- Explore opportunities with partner countries and regions to develop an infrastructure to support rapidly deployable laboratory systems used in the collection, analysis, and characterization of suspected or actual WMD.
- Work with partner countries and regions to develop and exercise plans for consequence management and identify potential capability gaps.
- Assist in improving new partner countries' capabilities to optimize CBRN threat identification, assessment, and response.
- Explore opportunities with partner countries and regions to conduct joint identification, development, and procurement of medical countermeasures and assist in regulatory compliance.
- Assist partner countries in the development of surveillance and reporting processes to improve compliance with International Health Regulations (IHR

2005).

- Work with partner nations and regions to enhance their capability to detect and destroy WMD delivered by missile systems.
- Work with partner countries to develop and support global CBRN surveillance.
- Assist partner countries in enhancing security of vulnerable nuclear materials.
- Aid partner countries in the cooperative development and adoption of best practices and baseline performance requirements that optimize the detection of radiological and nuclear material.

Other supporting documentation includes the *Threat Reduction Cooperation (TRC) Initial Capabilities Document (ICD)*.

Recommendation 5: Improve elimination² capabilities

Develop, test, and deploy improved elimination capabilities to counter WMD and emerging threats.

Applicable ACES: Interdiction, Offensive Operations, Elimination, WMD Consequence Management, Intelligence, Security Cooperation and Partner Activities

In the 2010 Quadrennial Defense Review report the Secretary of Defense directed the establishment of a Joint Task Force Elimination Headquarters with the mission to plan, train, and execute WMD elimination operations. In order to better plan, train, and execute WMD-elimination operations, the Commander, USSTRATCOM established the Standing Joint Force Headquarters-Elimination of Weapons of Mass Destruction in February 2012 to increase WMD disablement, exploitation, intelligence, and coordination capabilities. In order to diminish or remove WMD threats against the United States and its allies, as well as support national security strategy objectives, a proven capability to dismantle rogue state and terrorist WMD programs safely and effectively is required. In particular, the instability of Syria with its current stockpiles of chemical weapons is of significant concern in the near term.

- Improve intelligence gathering, analysis, and fusion (e.g., information management systems, decision support systems, sensor development, intelligence analysis capacity, and technical expertise) regarding State and non-State WMD proliferation, storage, and development activities.

² Joint Publication 3-40 defines elimination as, "Actions undertaken in a hostile or uncertain environment to systematically locate, characterize, secure, and disable, or destroy WMD programs and related capabilities."

- Improve and increase confidence in CBRN elimination technologies, including agent defeat capability development, agent destruction phenomenology research, models and simulations improvement, agent/environment interactions, and novel materials research for agent defeat.
- Explore applicability of commercial technologies for hazardous material (HAZMAT) destruction and CBRNE remediation for possible leverage and use in elimination missions.
- Improve capability to conduct exploitation of WMD sites, including characterization of local WMD, onsite analysis, and data exfiltration.
- Provide reliable, secure transportation and storage for further disposition of WMD-related materials.
- Continue to define the roles and responsibilities of elimination operations across the Interagency.

Other supporting documentation includes USSTRATCOM's *WMD Elimination ICD*.

Recommendation 6: Enhance Global CWMD Situational Awareness

Develop, test, and deploy a global CWMD situational awareness capability.

Applicable ACES: Security Cooperation and Partner Activities, Threat Reduction Cooperation, Interdiction, Intelligence

Situational Awareness (SA) to include CBRN/Emerging infectious disease surveillance is needed to understand and detect changes or anomalies in the steady state environment, facilitate information sharing, and provide greater warning in advance of crisis. Improvements to CWMD SA should be made to provide the DoD and interagency partners a holistic view into friendly and adversary vulnerabilities, threats, risks, capabilities, posture, readiness, possible courses of action that could be taken, and projected effects of the courses of action. CWMD SA is enhanced by improved access and sharing of information, including intelligence, operations, and plans; fusion of intelligence and information; collaboration via network services; visualization of information; and leveraging existing SA, collaborative planning efforts, intelligence capabilities, and common operational pictures.

- Continue development of the Global CWMD Awareness System (GCAS), including the implementation of a CWMD SA Fusion Cell for large data fusion and analysis and a supporting Systems Integration Lab.
- Develop, test, and deploy capabilities to:
 - model and understand the steady-state CWMD environment, including the security and vulnerability of materials and the supply networks of State and non-State actors seeking to acquire or use WMD;

- provide actionable information in support of efforts to prevent loss of sensitive materials, mitigate the risks associated with dual-use technologies, mitigate the natural and deliberate spread of disease, and respond to attacks and outbreaks when they occur; and
- identify activities to drive change towards desired end states, and assess whether change has occurred.
- Create a global community of interest to:
 - share information, thereby enabling existing and future partnerships to understand more fully the WMD challenge;
 - enable existing and future international partnerships to share information in a secure (network services) environment; and
 - allow dispersed decision-makers to work from a common information environment.

CONCLUSION

CPRC member organizations continue to make improvements in capabilities to address the threat of weapons of mass destruction. Improving integration and coordination for CWMD remains an important goal for the USG. Information sharing among participating CPRC organizations and achieving an efficient allocation of available resources are crucial to enhancing and improving the diverse portfolio of CWMD capabilities already available. Numerous Federal entities engage in CWMD research and development. The challenge is to coordinate all these activities in order to integrate solutions to this problem more effectively.



WORKS CONSULTED

Sustaining Global Leadership: Priorities for 21st Century Defense, January 2012

Chemical and Biological Defense Program Strategic Plan, June 15, 2012